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ON
THE PHYSICAL BASIS
OF
MENTAL LIFE

MAJOR NOEL

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THE PHYSICAL BASIS

70113

OF MENTAL LIFE.

A POPULAR ESSAY.

obert alph BY

R. R. NOEL.

LONDON:
LONGMANS, GREEN, AND CO
1873.

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PREFACE.

A CONSIDERABLE PART of the following essay formed the subject-matter of a lecture delivered in Leicester last November to the members of the Literary and Philosophical Society, and the public generally of that city.

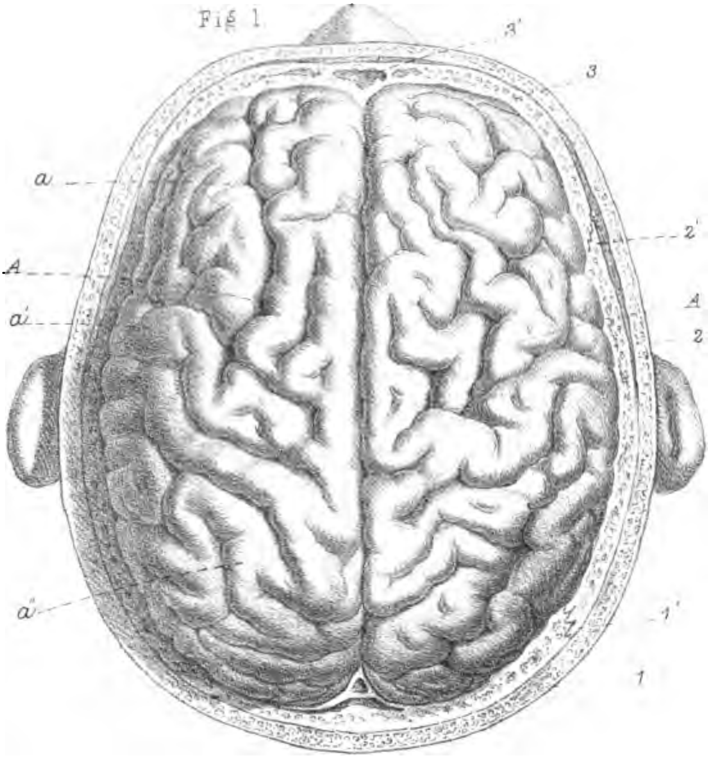
The time appears to me opportune for an appeal in brief form to a still larger public in favour of principles of mental science, of the truth of which a long course of observations, extending over the best years of my life, has rendered me fully convinced. As these years have been chiefly passed in Germany and Austria, the German language and literature have become more familiar to me than those of my father-land. It has been in those countries, moreover, that my collection of casts of the heads of eminent men, criminals, suicides, &c., and of national and other skulls has been formed. These circumstances are mentioned in explanation of the references in the following pages to German authorities in anatomy and physiology, and to German heads in illustration of the text.

R. R. N.

April, 1873.

PLATE 1.

Fig 1.



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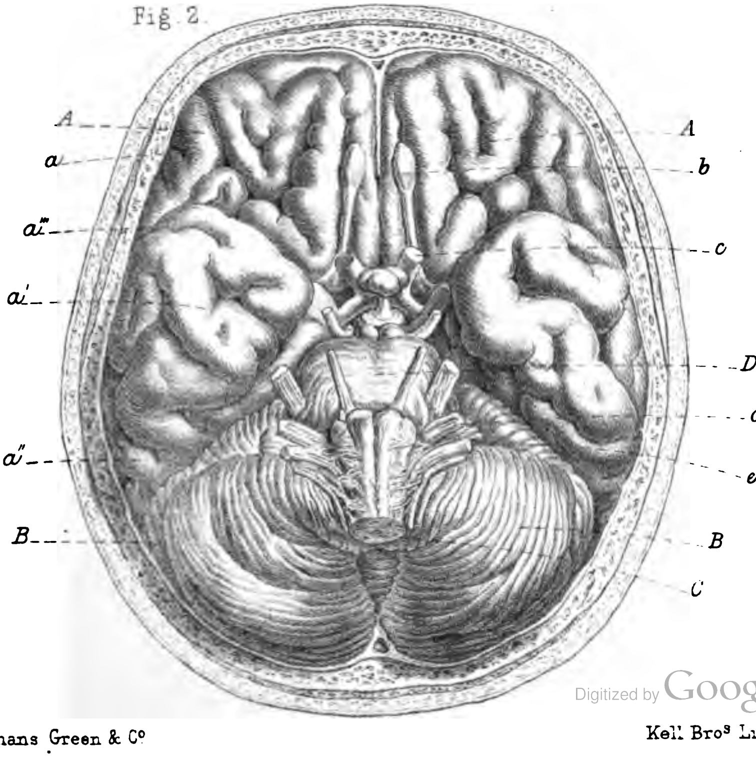

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LIST OF PLATES

AND

EXPLANATION OF THE ILLUSTRATIONS.

PLATE I.

FIG. 1. The brain, its coverings having been removed—viewed from above.

AA. The two hemispheres, with their convolutions; *a*, the frontal lobe, *a′*, the middle lobe, *a″*, the posterior lobe.

1. The occipital bone; 1′, suture between the occipital and parietal bones.
2. The parietal bone; 2′, suture between the parietal and frontal bones.
3. The frontal bone; 3′, the frontal sinuses.

FIG. 2. The basis of the brain viewed from below.

AA, *a*, *a′*, *a″*, same as in fig. 1. *a‴*, the sylvian fissure, separating the frontal from the temporal lobe.

BB. The cerebellum, with its two hemispheres and convolutions.

C. The medulla oblongata, showing the median division into two lateral halves: nearest to the fissure are the corpora pyramidalia, containing anterior fibres of the spinal cord; then come the corpora olivaria, containing lateral fibres; and behind these lie the corpora restiformia, containing posterior fibres of the spinal cord.

D. The Pons Varolii, the system of fibres connecting the cerebrum and the cerebellum.

b. The olfactory nerve and its bulb.
c The optic nerve.
d. The auditory nerve.
e. The nerve belonging to the sense of taste. (Glosso-pharyngeus).

PLATE II.

Figs. 1 and 2. Two skulls cut open horizontally, their basilar parts viewed from above.

A. The anterior fossa, seat of the frontal lobe.
B. The middle fossa, seat of the temporal lobe.
C. The posterior fossa, seat of the cerebellum.
D. The large occipital hole (foramen magnum), through which the spinal cord enters into the brain.

a. The frontal bone.
a'. The zygomatic arch.
b. The sphenoid bone.
c. The temporal bone.
d. The petrous portion of the temporal bone, separating the middle and posterior fossæ of the skull. Within the os petrosum lie the auditory nerves and apparatuses for the conveyance of sound.
e. The occipital bone.
f. The clivus, the part of the basilar bone on which the medulla oblongata and pons varolii repose.

N.B. Fig. 1. The basilar portion of the skull of a man of narrow intellect, though entirely removed from cretinism or idiocy. He was convicted in Saxony of arson, but on account of defective understanding, condemned to loss of liberty only. He was seen by me before his trial, and, after his death in the house of detention, I procured this drawing of his skull. The cast of his head is in my possession.

Fig. 2. The basilar portion of the skull of a man of average intellectual capacity. The supra-orbital plates of these skulls show a remarkable difference as to their size; whereas the other fossæ of the skulls are nearly similar.

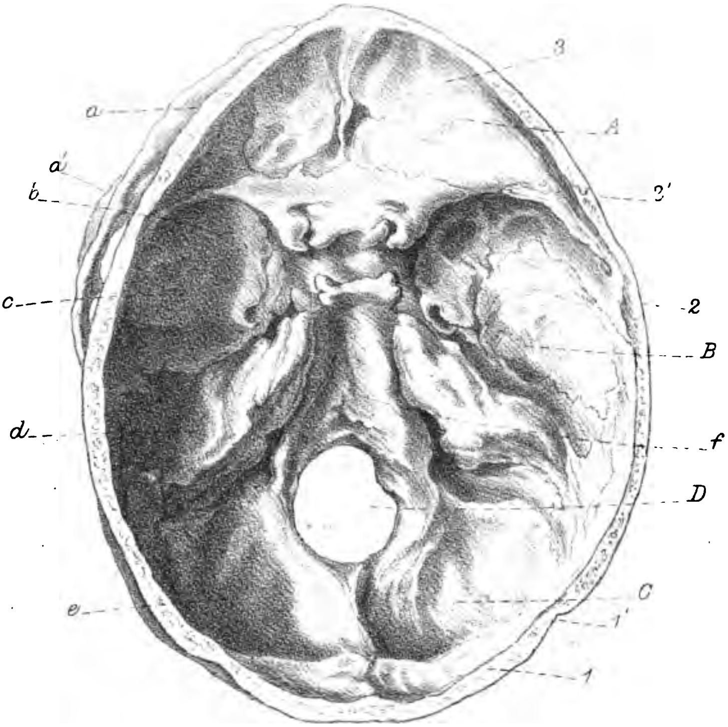
PLATE III.

Fig. 1. Brain of the celebrated German mathematician, Gauss.

Fig. 2. Brain of a German handworker. The drawings are from a German work, 'Das Leib des Menschen,' by Professor Reclam. They show a great difference in respect to the number and arrangements of the convolutions.

PLATE II.

Fig. 1.



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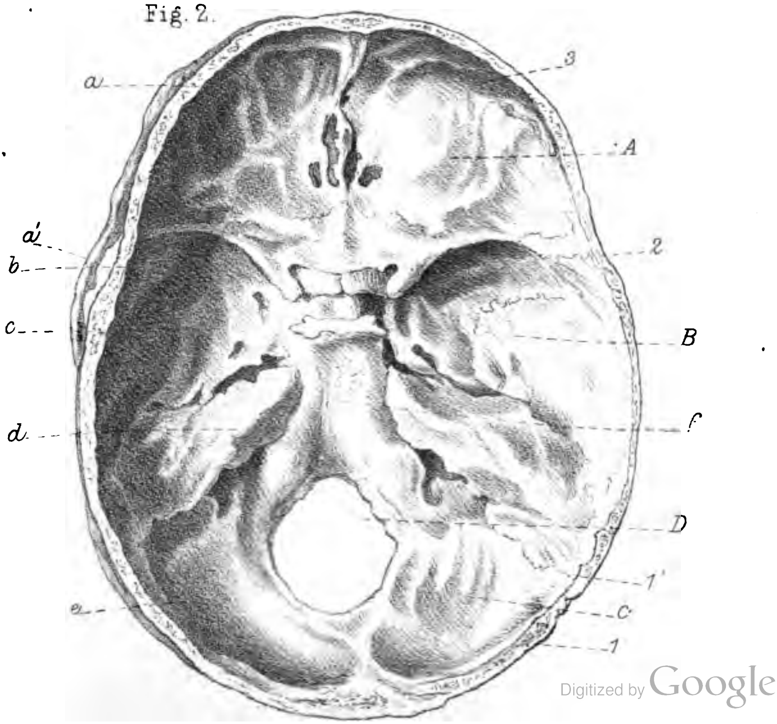

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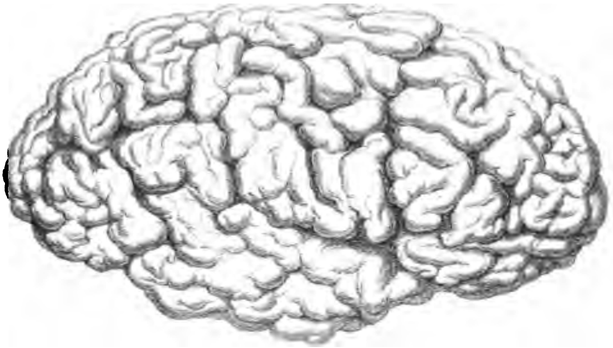

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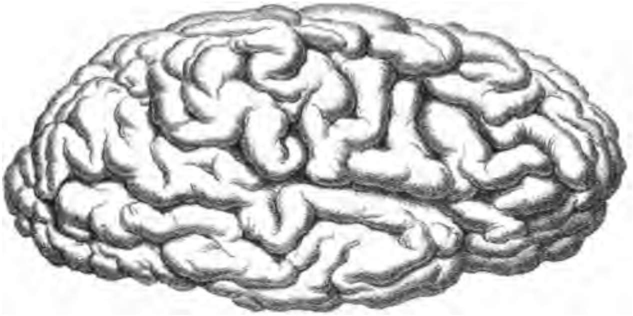

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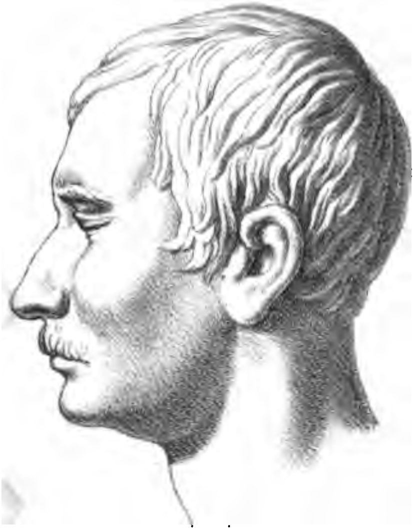

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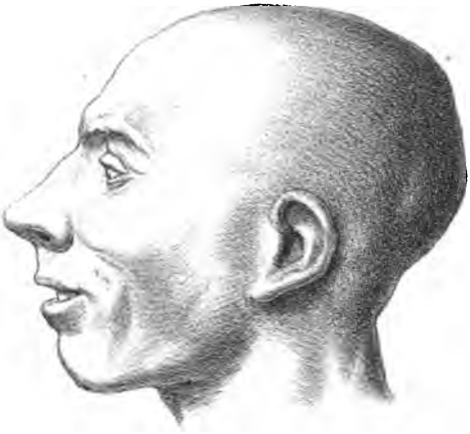

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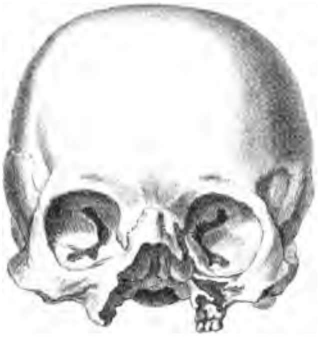

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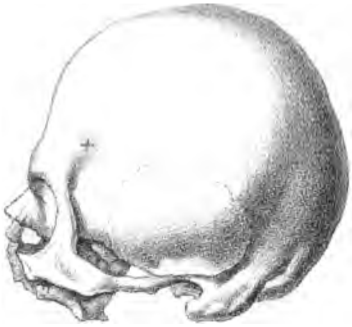

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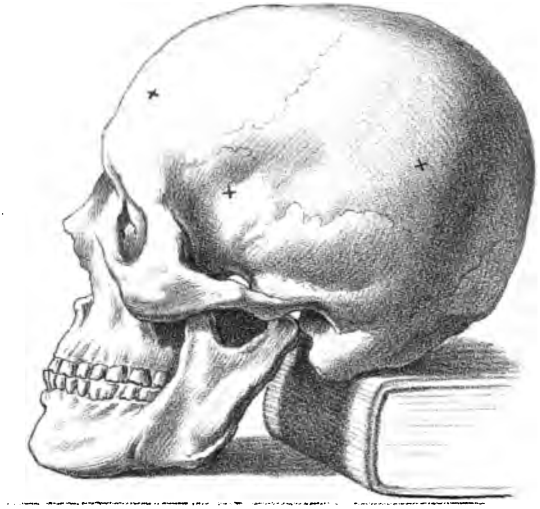

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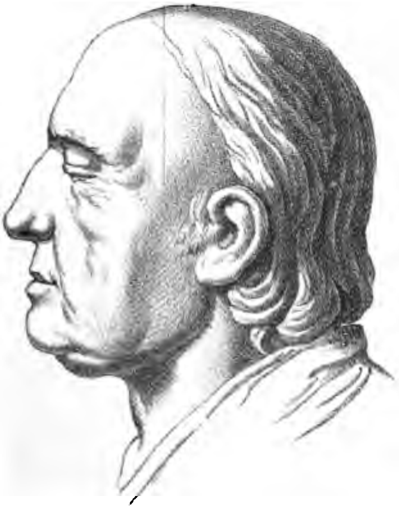

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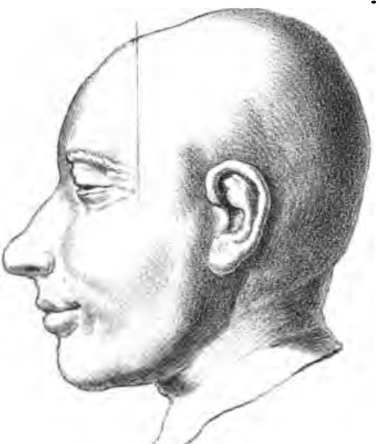

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Fig. 3. Drawing from a cast of the head of Professor B. von Cotta, a distinguished geologist, and man of great intellectual capacity.

Fig. 4. Drawing from a post-mortem cast of the head of a Saxon bookbinder, and a suicide.

PLATE IV.

Figs. 1 and 2. Front and side views of the skull of a cretin from the Alps.

Fig. 3. Side view of the skull of Schiller (the great German poet), from an original cast in my possession. The asterisk in the side view of the skull of the cretin, and the central one in that of Schiller, mark respectively the inward extension of the supra-orbital plates. The two other asterisks in the skull of Schiller mark the points of ossification in the frontal and parietal bones.

Fig. 4. Cast of the head (taken from life) of Dr. von Ammon, a very eminent theologian, writer and preacher. He was at the head of the protestant church in Saxony. His theological works are particularly remarkable for their highly humane and moral tone.

Fig. 5. Post-mortem cast from the head of Vetter, an incorrigible thief. Being condemned to the House of Correction for the seventh time—and this time for a very long period—he committed suicide by hanging.

N.B. With the exception of the views of the brains of Professor Gauss, the German handworker, and of the head of a suicide (plate III. fig. 4), the illustrations have been copied from drawings in my German work, 'Grundzüge der Phrenologie.' The original drawings were made on stone by a portrait painter and lithographer of great repute, Herrn Weinhold of Dresden. Whenever comparisons of two or more heads or skulls have been purposed, the proportions of the same have been mathematically maintained.

THE

PHYSICAL BASIS OF MENTAL LIFE

The doctrines of the schools called 'Mental Philosophy,' 'Psychology,' and 'Mental Science,' are based chiefly on more or less partial experiences, on speculation and abstract reasoning. Very few mental philosophers have been students of nature, careful observers of phenomena, and investigators of their efficient causes ; still fewer have been physiologists. Their observations have indeed had more of a subjective than objective character; have had more reference to the self-consciousness of individual thinkers, than to their fitness to solve the problems of the human mind in general. Moreover, such objective experiences as have been included in systems of psychology have been explained in agreement with preconceived theories of a spiritual mind, of an abstract entity. These modes of proceeding are very far from sound. To gain practical insight into the human mind, we must not only take cognisance of our own emotions, volitions, &c.— which, I allow, may be of value if our self-introspection be acute and free from the delusive influences of self-love —but of all those psychological facts of which we have historical evidence, as well as actual experience. And all manifestations of the mind require to be studied in connection with their organic conditions; for psychology, in its usually received sense, as treating of the human mind in especial, cannot be thoroughly understood unless considered as a part of anthropology, or the science of man.

In great contrast to the metaphysical doctrines alluded to, are the teachings of Dr. Gall respecting the faculties of the mind. Gifted with unusual powers of observation and reflection, the differences in the characters and capabilities of his companions struck him whilst still a boy at school; and at the same time he remarked certain coincidences in the forms of their heads. There are so many works in the English language—notably those of the late George Combe—which contain an account of Gall's youthful experiences and subsequent researches, that I shall not dwell on this subject. Neither shall I take up time by mentioning the names of those who—dating from very early periods of history—have paid attention to the forms of the head, and—however vague their observations and ideas about the mind—have believed that particular powers were located in that part of the body. In a certain sense, therefore, Gall may be said to have had precursors. But his turn for observation, and fondness for natural history, having led him to choose the medical profession, instead of that of the Church—for which his father had destined him—he was the first to perceive that the form of the head can have no physiological value unless it agrees with the development of the brain, and throws light on the functions of that organ, to which he devoted his full attention. It was indeed mainly through his labours that the old erroneous way of studying the anatomy of the brain by cutting off successive slices from the top, and noting the parts and appearances thus presented to view—to which strange names, from their fancied resemblances, were given—was abolished, and the physiologically sound method of investigating the fibrous structure of that organ, by commencing at the bottom, at its connection with the spinal cord, became generally adopted. As regards insight into the fibrous structure of the brain, however, Gall likewise had precursors, particularly Varol; and our Willis, in the middle of the seventeenth century, deserves mention for having called attention to the convolutions and their covering of grey matter. But that the teachings of the schools on the anatomy of the brain were mainly reformed through Gall's labours, I have been assured by eminent physiologists in Germany. Modern researches into the anatomy of the brain, whilst they have increased our knowledge of that organ, especially of its development-history, are, as will be shown, nowise opposed to the general principle of its functions as taught by Dr. Gall.

I must now more fully explain what it is that Gall did to place the study of the human mind on the basis of natural history and physiological experience. Although before him the brain had been often regarded by physiologists, naturalists, and students of human nature, to be the material instrument by means of which certain mental powers are manifested, yet these powers themselves were held to belong to an immaterial mind or soul, and to be subjects of conception and demonstration quite independently of the body. I here must allude, however, to the fact, that, practically, many great poets and dramatists—Shakespear in particular—in their delineations of human nature, have used the terms mind and brain as equivalent or convertible, and that in the sayings and proverbs of every civilised people there are many allusions to the head, to its size and shape, as indicative of mental qualities.

The German language is especially rich in such allusions, several of which, moreover, in connecting particular dispositions and talents with particular forms of the head, very nearly coincide with Gall's experiences. However, it belonged, in his days, I repeat, to the doctrines of the schools of mental philosophy, that the *human mind*—not, I must emphatically state, an abstract conception of mind or spirit *per se*—could be studied apart from matter, and that its attributes or powers are something essentially different from all those physical actions which are known to be functions of bodily organs. Thus it belonged to the doctrines of the schools that 'memory,' 'judgment,' 'imagination,' 'consciousness,' 'sympathy,' 'attention,' 'the will,' &c. are powers or faculties of the mind—for these terms have been, and indeed still are, used indiscriminately—and Gall was the first to show, by appealing to experiences and historical data, that such so-called powers are only general abstractions, giving no insight into the concrete, into particular kinds of memory, imagination, volition, &c. and the special capacities for the same in different human beings. For example, following out the lessons of his youth, the experiences he had gained amongst his schoolfellows of their individual aptitudes and dispositions, he called attention to such facts as that a man may have a fine perception and vivid consciousness of musical sounds and their combinations, great memory, judgment and imagination concerning them, yet have a poor perception, memory, &c. in regard to the external forms or configurations of objects, which in another man may be powerful. To such extent, in fact, do these natural gifts of perception, memory, &c. vary, that the one man may be born a genius for music, the other for plastic art. In like manner, he pointed out that memory, judgment, &c. are connected with capacities for languages, for mathematics, mechanics, or other branches of science which, whenever successfully pursued, are usually regarded as special talents. And not only were intellectual powers closely observed and investigated by Gall, with reference to their elementary nature and organic conditions; but all strong manifestations of natural dispositions, passions, propensities, &c. were studied by him in a similar way. Gall was an uncompromising hater of mere theorisers and systematisers[1]—ideologists, as he called them; and it was well it was so, for had he been imbued with the doctrines of any particular school of psychology, he could not have been the acute and unbiassed observer he proved himself to be. Instead of regarding the human mind from a transcendental point of view, he boldly adopted the natural-history method of investigation, upheld the principle of man's connection with the animal world in general, and sought insight into the lower and simpler forms of mental life, before extending his researches into the higher and more complex. As he likewise carefully noted the form of the head in every instance of prominent talents, dispositions, &c. that came under his observation—and, whenever possible, procured plaster casts of remarkable heads, the skulls of murderers, suicides, &c.—his researches throughout maintained an objective character, unobscured by subjective speculations based on inward consciousness, such as naturally have given rise to great variety of doctrine and frequent controversies in the schools of mental philosophy. Thus, by degrees, as his experiences accumulated, and by the inductive method of reasoning, he gained insight into faculties of the mind which he called primitive or fundamental—the main sources of human actions—and into their connection with particular forms of brain-development. Many of these faculties, Gall, by referring to natural history, to the instincts, propensities, &c. of animals, showed to be possessed by them as well as man; others, as the power of articulate language, to belong to man alone; others, again, as the power of abstract reasoning, and the moral sense, if not to be altogether denied to some of the higher animals, yet to exist in them only in a rudimentary state. These views he further found confirmed by the comparative anatomy of the brain.

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[1] 'Je suis plus glorieux de la découverte de la plus mince vérité que de l'invention du plus brillant système.'—Gall, *Sur les fonctions du cerveau*, *etc.* tom. vi. p. 502.

Gall's teachings respecting man's moral nature have given more offence to metaphysicians and theologians than his views about man's intellectual powers. Yet close attention to facts will show the one category of mental life to be as dependent on organic conditions as the other. As bearing on this point, I cannot refrain from quoting the words of a great observer of human nature, of the great poet of Germany, who in his 'Wilhelm Meister' makes Natalie, one of the characters in the tale, relate the following of another, the abbé: 'He asserts that activity is the chief thing in man, and that we can do nothing without the capacity for it, without the instinct which impels us to it. It is acknowledged, he says, that poets are born; and in respect to every art a similar admission is made, because it is unavoidable, and because these results of human activity can, even in semblance, scarcely be imitated. But if we examine the matter closely, even the smallest capacity is inborn, and there is no such thing as an indefinite capacity.'

It is necessary to explain more distinctly what is meant by 'fundamental or primitive faculties,' and to state that, in view of the now much mooted question of the origin of species, including man, I use the terms primitive and fundamental in a restricted sense, as applying to historical data only.

Fundamental faculties, according to Gall, are those inborn and inherited dispositions to particular forms of mental activity (emotions, passions, propensities, talents, &c.) which display an instinctive character;

which belong to the manifestations of the mind from infancy upwards ; are displayed as so-called psychical reflex-actions (from their analogy to the more automatic reflex-actions emanating from the spinal cord) ; and which, in adults, are most easily studied by observing the actions of savages, and of the more impulsive individuals in civilized communities. The infant, as is well known, seeks its nourishment instinctively; if smiled upon and caressed, it will smile in return ; whereas frowns, harshness in voice or looks will affect it depressingly, and cause even terror in its young soul. As the child grows up, various dispositions and psychical reflex-actions will be manifested. It will glow with pleasure when praised, blush or become angry when blamed, turn pale with fear at the approach of danger, respond to affection, show a tendency to greediness, to falsehood and cunning, to passion, or to despondency on the slightest check to its desires; or, on the other hand, natural amiability, so-called kindness of heart, and readiness to sympathise with the joys and pains of others, truthfulness, &c. will be displayed. We see various reactions on impressions from without which disclose individual tendencies, and, on the whole, likewise show the activity of faculties common to humanity. Throughout the life of every individual, moreover, may be observed, more or less prominently, tendencies to psychical reflex-actions, even in instances where superior education, and the cultivation of the understanding have developed the power of self-control, which power, again, can be shown to have likewise its organic conditions. Some men are habitually proud and grasping ; some truthful, some false ; others are vain, and constant courters of admiration ; some, again, are inordinately sensual ; some over sensitive, or cowardly ; others bold, rash, cruel, or vindictive ; and there are many other signs of the natural disposition unnecessary to enumerate.

On the one hand, man is said to be the creature of circumstances ; an admirable German proverb, on the other hand, says, 'An ounce from the mother is more worth than a pound from the school.'[1] If we look to individual character, the latter view is undoubtedly the sounder. But there is truth likewise in the former, especially when we consider the development-history of the human species, and the different branches or races now inhabiting different parts of the globe.

The natural disposition of a man, as shown in early life, I may add, does not radically alter, though circumstances, age, and experiences greatly modify the activity even of very prominent faculties. Indeed, whenever the natural character of any one is well known, it is easy to foresee what his or her conduct under particular circumstances will be.

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[1] The Irish have an analogous saying, viz. 'A pound of mother wit is better than a ton of learning.' It is significant that in the sayings of both that country and Germany, the mother is alluded to as the fountain head of natural gifts. Although special talents, as for mathematics, mechanics, music, &c. are frequently seen to be inherited from the father, yet, according to general observations, and in many instances known to me, mental power appears more frequently to come from the mother than from the father. Nearly all great men have had healthy, energetic, and intelligent mothers.

It was, as already mentioned, by looking for striking instances of natural character, talents, &c. and by negative as well as positive evidences ; by examining a vast number of heads and skulls, that Gall at last believed himself able to point out the existence of at least twenty-seven fundamental or special faculties in the mind, and to their seats or organs—if they may be so called—in the brain. His views have subsequently been further developed by his disciples and followers, and worked up into a 'system of phrenology,' of which I shall presently speak. I will here only observe that 'phrenology'—doctrine of the mind—is not an appropriate name for Gall's psycho-physical researches and cranioscopical experiences ; and to his two great works in the French language in which he made them known to the world, he prefixed respectively the titles : 'Anatomie et physiologie du système nerveux en général et du cerveau en particulier,' and 'Sur les fonctions du cerveau et sur celles de chacune de ses parties.' One of his disciples, Dr. Forster, was the first to apply the word phrenology to designate the principles of mental science, viewed as a whole, resulting from Dr. Gall's investigations. It was adopted by Dr. Spurzheim, and as it was mainly in consequence of the travels, lectures and writings of the latter in this country that Dr. Gall's experiences became known to us, the word phrenology came into general use. If, however, objection be taken to this word, we may reflect that there are other sciences, or departments of human knowledge, not appropriately named—geology for instance; and even the science of physiology is not exactly what the etymology of the word would indicate. As long as there is a correct understanding of the basis, the aim and the scope of phrenology, it appears to me now not worth while to reject a word which has, so to speak, received the rights of citizenship amongst us.

In the first instance, it must be allowed, Gall named the innate faculties he believed he had discovered in an empirical and narrow way, and thus he offered a ready handle to his opponents to accuse him of coarse materialism, and of breaking up the mind into fragments, whereby a sin was committed against its unity. Having observed in the heads of murderers and persons of an unusually cruel disposition a part of the temporal bone particularly prominent, and a corresponding development in the sculls of the carnivora, Gall—abstaining from theorizing, and in agreement with his experiences—called the part of the brain beneath the prominence alluded to, the seat of a sense or instinct for killing and for murdering ('instinct carnassier; penchant au meurtre'). An outcry was forthwith raised against him for teaching that man is born to be a murderer, and irresponsible for one of the very worst of his actions; and this misconception of his views has lasted to the present day. What Gall taught was simply—that a particular part of the brain, when abnormally developed, and not having its action modified by other faculties, moral and intellectual, frequently leads to the committal of murder. In his work on the functions of the brain, Gall gives the natural history of the faculty in question, and, by a vast array of historical data, particularly the records of crime, he shows that there is in man a natural disposition to shed blood, and not only to kill whatever creatures he requires for food, but generally those that come in his way, whether injurious to him or not. In extreme cases, he adds, positive pleasure is taken in slaughtering, even in acts of cruelty and torturing, as many murderers, when on the scaffold, have acknowledged.

Spurzheim, Vimont, Brousais, Félix Voisin,[1] G. Combe, myself, and other followers of Gall, have added many facts to those enumerated by him, and have entered fully into the different forms of activity of a faculty of 'destructiveness,' as the one in question now is called, and into its influence on human conduct in general. The facts and arguments of the named writers are worthy of earnest consideration, particularly as they offer a more natural and satisfactory explanation than any theories of metaphysicians and moralists have done, of the undeniable and terrible instances of man's bloodthirstiness and cruelty with which history abounds. Murderers, I may add, when their passions are calm, have frequently found themselves unable to give any other explanation of their horrible deeds than in saying they were committed at the 'instigation of the devil!'

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[1] 'De l'homme animal.' Paris, 1839. A work particularly valuable, as showing the connection of man with lower animals.

Facts, psychological and cerebro-morphological, and inductive reasonings, similar to those used by Gall in proof of an inborn faculty for destroying life, are brought forward by him to show that there are other animal faculties in the mind of man. As my chief aim, however, in this essay, is to establish the general *principle* of localisation of mental faculties, I must content myself with referring to Gall's works, and those of his followers, for the data on which the conclusions alluded to have been arrived at. And with regard to the works of Dr. Gall, I must express my opinion that they have been almost entirely ignored in this country. With the exception of my late friends Dr. Elliotson and George Combe, and

Mr. Charles Bray amongst the living, I have never met with any Englishman who had read them. Indeed, the chief opponents of phrenology—those who have made themselves the most conspicuous for the tone of apodictical certainty and contempt with which they repudiate its principles—have, at the same time, plainly disclosed their ignorance of the labours and teachings of Dr. Gall.

It is not to be inferred from what has been said concerning 'fundamental faculties' that Gall was so wanting in insight into the phenomena of mental life as a whole, as to imagine that any particular faculty could be observed in an isolated state of activity. Neither did he fancy that he had discovered a sufficient number of faculties to account for all human actions. All mental states are more or less complex, display the associated activity of various faculties, intellectual and emotional, together with the results of their education, not to speak here of other circumstances, physiological and pathological, as the general constitution, and the state of the blood and the viscera, their action and reaction on the brain, and consequent influence on mental life. However necessary, therefore, for the full comprehension of the latter in its more intricate forms and phases, to take into consideration all the circumstances alluded to, nevertheless, in human actions some particular impulse or motive may be seen to predominate ; and it was, I repeat, the observation of strong impulses, under great variety of inward and outward circumstances, and of the coincidences in the forms of the head, which guided Gall in his studies of human nature.

It is quite unnecessary at the present day to cite authorities in physiology in proof that the brain is regarded as the organ of the mind; or, as some physiologists still prefer to express it, as 'the material substratum for the manifestation of mental actions.' A celebrated German physiologist, Johannes Müller, has declared that, in view of the differences in the mental life of human beings, *à priori*, nothing can be said against the general principle of Gall's system.'[1] He rejects Gall's 'organology,' however, for several reasons, one of which is, that 'no province of the brain can be shown to be the seat of memory, imagination, &c.' Undoubtedly, as I have pointed out, it must be so; and the other psychological objections to Gall's teachings are based by Müller on his conception of the human mind as a metaphysical entity.[2]

A later German physiologist, Valentin, has, however, declared it to be theoretically necessary that mental faculties should be localised;[1] and another physiologist, Rudolph Wagner, says: 'Investigations appear to have had the remarkable result, that the mechanical apparatuses (the brain) for the manifestation of mental actions (Seelenthätigkeiten) in different human beings, already in their fundamental and embryonic developments, display positive sexual and individual peculiarities, which have a decided influence on the form (Ausbildung) of the mind in later life. With a certain limitation, it may therefore be said that anatomically genius and idiocy are innate, as the development-history of brains shows.'[2]

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[1] 'Handbuch der Physiologie des Menschen.' Coblenz, 1844, vol. i. p. 730. (I cite this edition of Müller's work, as it is later than the one translated into English.)

[2] In my German work 'Grundzüge der Phrenologie,' 2nd edition, I have spoken fully of Müller's objections to 'Gall's system.'

This statement of an eminent physiologist, who certainly cannot be said to have belonged to a materialistic school of philosophy, entirely upholds the main principle of phrenology, for the law which applies to extreme cases must necessarily apply to intermediate; and every human being has an inborn character, an individuality, however little remarkable it may be, especially to superficial observers.

By the term 'individuality,' I do not imply homogeneousness. The human mind displays 'variety in unity,' a 'unity of opposites'—to borrow a phrase from German psychologists; and the striking alternations of feeling, the antithetical nature of the passions which one man may display, not only in different periods of his life, but in different moments of one day, can again be cited in proof that the mind is a congeries of faculties, each of which—as the brain is the acknowledged organ of the mind—must be specially located in it. Were it otherwise, and were *all* parts of the brain equally active in *all* states of mind, it would be inexplicable that very opposite feelings, for instance, those of love and hatred, can be manifested by the same person often in quick succession; each feeling, moreover, in the expression of the eyes, the face, the voice, and gestures, manifesting itself as a psychical reflex-action independently of the will. Such reflex-actions indeed are frequently condemned by the judgment, not only when their exciting causes are past, and the feelings become calm, but in the very moments when we are conscious of, and deplore, the betrayal of our emotions to others.

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[1] 'Lehrbuch der Physiologie des Menschen.' Brunswick, 1844, vol. ii. p. 816.

[2] 'Göttingen gelehrten Nachrichten,' 1861, No. xxii. p. 392.

In further support of the principle of a plurality of faculties, I may add, that savages and men whose mental life on the whole must be considered inferior are not in all respects wanting in power. Certain passions and aptitudes may be more vigorous in them than in persons more generally gifted. And the latter, on the other hand, may possess one or more faculties in a mere rudimentary state. Men who have left their stamp on history have been wanting in a sense for music, for poetry, arithmetic, &c., not to speak of glaring deficiencies of the moral character, of which Napoleon I. was a striking instance.

And the deficiencies in capacity or character, to which I have alluded, may, as a rule, be shown to be innate, and not the mere consequences of neglected or one-sided education. Indeed, the greatest efforts, as is well known, are generally found inadequate to elicit talents or moral qualities ; whereas, on the other hand, when they are naturally strong, unfavourable circumstances are powerless to prevent their display.

The heads of the two sexes, likewise, agree with the phrenological principles. Those of men generally are larger, and their brains heavier, than is the case with women ;[1] and there are particular differences in the forms of the heads of the two sexes which agree with the generally acknowledged differences in their natural characters. The emotional category of mental life is relatively more prominent in women. This coincides with the relatively larger development of the coronal region of their heads. But it is now the fashion to attribute the differences in the characters and capabilities of the sexes to 'man's tyranny,' and according to the views of some of the advocates of 'women's rights,' great changes soon will take place. It may be so, but this will not affect the conclusions drawn from historical data, and from what may now be observed.

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[1] A German physiologist, Dr. Weisbach, who has much occupied himself in studying female and male skulls, gives as the result of his investigations the cubic contents of the skulls of German women to be to that of German men as 878 : 1000. ('Archiv für Anthropologie,' vol. iii. p. 59, and fol.)

Dreams, likewise, their very diverse and bizarre nature, yet on the whole showing agreement with our inherited dispositions, as well as with the particular incidents and experiences of our lives, find an explanation in a plurality of faculties, in the activity of some in sleep, whilst others are in a state of complete or comparative repose.

Monomania, hallucinations, and *idées fixes*, displaying certain faculties in a morbid state of activity, may also be cited in support of the principles of Phrenology.

From early periods of history attempts have been made to find a key to the intelligence of animals in the size and weight of their brains, in the relationship of the latter to the size of their bodies on the whole, or to the amount of their nerves in particular. All such attempts have failed in yielding satisfactory results. Neither absolutely, nor relatively to his body or nerves, has man the largest brain. Elephants, and some of the marine mammalia, have larger brains than man. Birds generally have larger brains in proportion to their bodies; apes, dolphins, and many birds have larger brains in proportion to their nerves. It is only by the study of embryology, of the growth of the brain and the convolutions on its surface—to which special attention will be presently directed—that the pre-eminence of man anatomically becomes apparent.

Beginning with the lowest vertebrates, fishes, and ascending to man, there is found to be a gradual increase in the development of the brain, in harmony with the gradual increase of mental life. The elementary parts of the brain, the continuation of the spinal cord, the trunk of the brain, and the several centro-basilar gangliform bodies—as also the brain cavities or ventricles—are very similar in all human beings, and corresponding parts are generally recognizable in the vertebrates, particularly the higher. The elementary parts become gradually covered, and more and more as we approach to man, until in him they are completely covered by a new and peculiar system of cells and fibres, called the mantle of the brain (Pallium). It is this peculiar, elevated and finely arched system which is likewise called the cerebrum, and which forms five-sixths of the entire contents of the human skull. It is divided into two, generally equal, portions, called hemispheres, by an anterior and posterior median fissure ; the two halves, however, are greatly connected, mainly by a large commissure, or system of transverse fibres (corpus callosum). The superficial parts of the brain are also distinguished as lobes and convolutions, of which more will presently be said.[1] The brains of the Catarrine apes of the Old World most nearly resemble those of man. Microcephalic idiots have fœtal brains, showing arrested development, and absence of the secondary or supplementary convolutions. In several respects they are inferior to the brains of the higher apes.

It would not be in agreement with the purpose of this essay to enter fully into the anatomy of the brain and nervous system in general. I must confine myself to a few observations, and chiefly such as have a special bearing on the main principle of phrenology, viz. the localisation of mental faculties.

For the special consideration of the nervous system, anatomists distinguish three groups of organs; viz. the groups of the central organs (cerebro-spinal system); those of the peripheral conducting organs—including all the accumulations of grey substance, or ganglia, therewith connected; and the group of the peripheral end-organs.

There are two kinds of nerve substance, the fibrous and the cellular; the one for the most part white, the other mostly grey. Fibres resemble the finest threads or filaments of different degrees of thickness, but all extremely minute, many requiring to be magnified 400 to 500 times to render them clearly visible. Every nerve fibre consists of at least two elements, the so-called primitive or axis cylinder, and a delicate membranous sheath (neurilemma). The slenderest nerve fibres, belonging chiefly to the cerebro-spinal system, display this composition, though the stronger fibres are found to have another substance (nervenmark) between the primitive cylinders and their sheaths. Nerve fibres generally are held to be conducting media. In the spinal cord and its peripheral extensions there are systems of centripetal or sensory, and centrifugal or motory fibres, to which fibres of the ganglionic or sympathetic system are added. The latter being mainly connected with vegetative functions, the nourishment of the body, and only indirectly with mental life, I shall not take them into special consideration.

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[1] Views of the Brain, Plate I.

The motory fibres form the anterior, the sensory the posterior columns of the spinal cord.[1] The first are somewhat thicker than the latter. There is likewise a division into lateral columns, in which both motory and sensory fibres are represented, but chiefly the first. At intervals many millions of primitive fibres issue from the spinal cord, and are collected together in bundles (fasciculi), and run in sheaths to all parts of the body, remaining, however, distinct and isolated throughout their courses. They are further connected at intervals, and intermingled with grey cells, forming highly complicated knots or ganglia. Bundles of primitive fibres are what are commonly called nerves. In appearance they are compared to the bundles of delicate feathers, glass threads, or fibrils made by glass blowers. The fibres of the motory and sensory systems, when running in apposition in the same sheaths, are known by experiments to have different conductor-functions, though, absolutely speaking, boundary lines of the different sets of fibres are not distinguishable.

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[1] I use the word columns for the divisions of the spinal cord, as I find it thus used in English anatomical works. The German anatomists more correctly call those divisions the anterior, posterior, and lateral cords (Stränge), and still use the term spinal marrow (Rückenmark) for the whole contents of the vertebral column.

The centripetal or sensory nerve fibres convey impressions (received through the instrumentality of the peripheral organs of sense) to central organs in the spinal cord, at the basis and interior parts of the brain, and further on to the grey substances in the superficies of that organ. The centrifugal or motory fibres convey from central organs impulses to the muscles, whether of the more simple, automatic and reflex character proceeding from the grey cells of the spinal cord, or of an instinctive and psychical reflex nature, and of the conscious will, which, as previously mentioned, proceed from the convolutions on the surface of the brain; the minute grey cells and fibres so richly abounding therein being now generally regarded as the most important elements of psychical life. It is these superficial parts of the brain, moreover, which are the most plentifully supplied with blood by a complicated network of the most delicate vessels.

The nerves of special sense, several of which, as for hearing, sight, smell, and taste, belong to the head only, are, like all other nerves, composed of primitive fibres. They are connected, as is well known, with external apparatuses (the eye, ear, &c. in which are cells), specially adapted for the reception of different kinds of impressions, called their 'adequate stimuli' (waves of light, of sound, &c.), which they conduct to gangliform bodies in the centro-basilar parts of the brain, and further on to the convolutions on its surface. As all conscious perception, memory, &c., are connected therewith, it is unnecessary to say more of the nerves of so-called 'special sense,' and their conductor-functions, both innate and developed by exercise.

Nerve-cells are of different forms and sizes, some globular, some pear or club-like, and others very irregular in their shape. But the globular form is held to be the primal or fundamental, and it greatly abounds in the convolutions of the brain. Accumulations or knots of nerve-cells, intermingled with primitive and still more delicate fibres, or fibrils—the latter appearing to grow out of the cells—are, as stated, called ganglia. Peripheral ganglia are distinguished as belonging to the cerebro-spinal system, and likewise as forming the so-called sympathetic or ganglionic system. They may be likened to minor stations for the reception and further transmission of impressions from within and without—for the formation, from the cells, of nerve-fibres. They appear to act, too, as repositories or reservoirs of the 'nervous principle;' and the ganglia of the sympathetic system to have other vital functions. But although the centralization of the nervous system is found not to be absolute, yet it is taught that 'all other collections of nerve-cells besides the brain not only possess a very limited sphere of function, but are in many ways connected with the brain by bands of dependence."[1]

The development-history of the spinal marrow (medulla spinalis) shows that the formation of the grey kernel, or interior, precedes that of the white exterior part. The latter becomes subsequently attached to the grey substance, not from the first as a connected covering, but in two separate masses: one posterior and smaller, which in the end forms the posterior column of the spinal cord, and another larger, which forms the common basis of its anterior and lateral columns.

When fully developed the spinal cord displays two longitudinal fissures, one in the centre of its anterior, the other in that of its posterior portion; and thus it is divided into two symmetrical lateral halves, which are connected by a transverse commissure. From each of these halves, along their whole lengths, the roots of the peripheral nerves issue horizontally.

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[1] 'Lehrbuch der Anatomie, etc., des Menschen,' by Prof. Dr. Aeby. Leipzig, 1871, p. 813.

All the white fibres of the spinal cord extend towards the brain. In the part directly connecting the brain and spine, the medulla oblongata, the fibres become rearranged and then branch off in different directions. Fibres of the anterior column—which are stronger than those of the posterior—enter the cerebellum and the corpora quadrigemina, and thence pass into the frontal lobe of the brain. The fibres of the posterior column enter chiefly into the part of the brain nearest to it, viz., into the posterior lobe. But both in the cerebrum and the cerebellum all the fibres of the spinal cord are represented. It is noteworthy that whereas the grey cellular substance forms the interior part of the spinal cord, in the brain it is chiefly on the surface.

Cells, generally speaking, have been considered to be *the* organic element. But in a physiological sense they are no longer thus regarded, for they are now held to be particular organisms. Protoplasm, found within cells, has likewise been considered as *the* elementary substance of organisms. But this, again, is said by many authorities on anatomy not to be a simple, but a complex substance. Whatever further investigations may bring to light respecting the ultimate element of organisms, nerve-cells are undoubtedly of the greatest importance for all the higher manifestations of life. Embryology teaches that not only in the spinal cord, but in the nervous system generally, the cellular formation precedes the fibrous, which latter is said to have its origin in the former. It is taught too that 'spontaneous motion on inward impulse, or the power of itself to change its form, is the inherited quality of all cells,' which, moreover, increase in number by division. It is even said that, 'in certain circumstances, after a cell has been artificially divided, the separate parts display the same phenomena of life as the entire cell, viz. breathing, motion, nutrition, and increase in number.'[1]

I have said enough to show the importance of nerve-cells, and we will now glance at the development-history of the brain, for further insight into their relation to that organ.

Researches into the embryonic development of the brain have shown that it begins as a bladder-like swelling on the upper, completed end of the cylindrical spinal tube. At first uniform, it soon receives two indentations crossways, and thus falls into three particular, but connected parts, which are the groundwork of that number of typical divisions of the brain, called the front brain (prosencephalon), the middle brain (mesencephalon), and the hind brain (ephencephalon). Of the three named bladders, the middle one alone maintains a simple character, the front and the hinder becoming greatly extended by their anterior ends, bag-like, rising upwards and turning backwards; and thus to the original bladder-like formation a supplementary one is added, which, as in course of time it grows into a particular part of the brain, must be regarded as a further typical division of the first formation. Both supplementary bladders are at first small and inconsiderable, but they soon sprout over the original bladders to which they belong to such an extent that only a small portion of them, namely, the ground (Boden), remains uncovered. In this way the so-called mantle of the brain, in contrast to its trunk, is formed, which, besides the front and hind brains, draws the whole middle brain into its department.

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[1] Address of Professor Preyer of Jena, 'On the Investigation of Life,' at the 50 years' Jubilee of the annual assembling of German Naturalists (Naturforscher), &c., 1872.

The further development shows this peculiarity for the original bladders, that the frontal and hinder have their central surface rent asunder longitudinally, producing a considerable opening of the hitherto closed inner ventricles.[1]

In addition to the median division into hemispheres already mentioned, in the course of the fœtal life of the brain many indentations or fissures are formed on its entire surface. Many of the earlier of these are but of a temporary nature, and disappear. In the ninth month of gestation, however, the human brain is said to present a scheme or picture of fissures (sulci) and convolutions (gyri) which is particularly instructive as regards subsequently distinguishing those which are typical or primary from those which are supplementary or secondary. The convolutions are regarded as foldings of the superficies of the brain—to which, in man, they give a twelve-fold increase. They are smaller and more closely packed in the frontal lobe than in any other equal portion of the brain superficies. Convolutions, generally, are presumed to be owing to the growth of the hemispheres being more rapid than that of the bones of the skull, a check to expansion naturally causing foldings. This view especially applies to the secondary convolutions formed after the skull-bones have come into contact, attained consistency, and several of them become firmly united. 'The growth of the different parts of the mantle is relative'—to quote the words of an anatomist who has specially studied the development-history of the brain,[1] and this means, they are not developed simultaneously, nor in equal degrees.

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[1] Op. cit., p. 822.

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[1] 'Archiv für Anthropologie,' vol. iii. p. 245.

It is an undoubted fact, of which I have had considerable experience, that the brains of men who have been distinguished for mental power display more numerous and asymmetrical[1] convolutions, with deeper fissures between them, than do the brains of men of ordinary capacity. There is, in fact, a considerable difference in the hand and the head-working classes in European countries, not only shown in the more numerous convolutions of the latter, but in the relatively larger development of the frontal lobe.[2] (See Plate III., figs. 1 and 2.)

I have spoken hitherto of the cerebrum only, but the cerebellum, or little brain, requires a brief consideration. Like the large brain, it consists of two hemispheres of lobes and convolutions, which, however, are very different in form, and more symmetrical on both sides than is the case in the cerebrum. The surface of the cerebellum is grey, and the colour deepens somewhat towards the interior. It possesses fibres from all parts of the medulla oblongata—the connection of the spinal cord with the brain—has its own system of more delicate fibres, and cells of different sizes. The two brains are likewise closely connected by a system of fibres (pons varolii) extending round the frontal and upper portion of the medulla oblongata. (See Plate I., *b*.).

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[1] The convolutions in the brains of infants and some Negroes are said to be symmetrical in each hemisphere. Todd's 'Encyclopædia of Anatomy and Physiology,' vol. iii. p. 697.

[2] The views of those political enthusiasts who fancy that by breaking with the past, and introducing thoroughly novel institutions, not only general happiness, but equality of mental gifts would be the speedy outcome, are not supported by physiology. Equality in mental life does not, and probably never can exist. However, the descendants of men of ordinary calibre, even of the mental sluggards of to-day, if through a series of generations their mental faculties have been duly cultivated, may in course of time have brains as well developed as those of our present head-workers; and the descendants of the latter, particularly of those whose brains have been over-taxed, may become inferior to the descendants of the former.

Professor Aeby says: 'At present, neither the morphological nor physiological import of the cerebellum is known.'[1] It is said, however, by many authorities in physiology not to be connected with intelligence, but to be the 'co-ordinator of muscular movements.' From its complicated structure many special functions may be inferred, one of which, I am convinced, is connected with sexual love. Its seat in the lowest cavity (fossa) of the occipital vertebra being well marked, and its general size easily estimated, I have found by extensive experiences, positive and negative, that, as Gall taught, the instinct of sexual desire ('instinct de la propagation, instinct vénérien,' &c.) is undoubtedly a function of the cerebellum.

It appears to be likewise a regulator of locomotive movements in general. As bearing on this point, I may add that muscular exercises in youth belong to the best known means of checking a too early activity of sexual desires ; and that in adults their gratification in excess frequently ends in muscular weakness and inability to regulate the movements of the limbs. But the spinal cord is likewise active in sexual relationships, and suffers too from excesses. Although in either sex, love in its higher forms displays more or less of the whole mental character, yet its fundamental element must be sought in a special instinct or cerebral function. A psychical reflex-action of strong amativeness is shown, moreover, in the peculiar expression in the eyes of those in love. The optic nerve roots in the cerebral bodies —corpus geniculatum and the neighbouring optic thalami and corpus quadrigeminum. As the last named body receives numerous nerve-fibres from the continuation of the anterior, or motory column of the spinal cord, and from the cerebellum, the peculiar expression in the eyes of lovers, when gazing at one another, may thus perhaps be anatomically explained.

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[1] Op. cit., p. 840.

Having read all that has been advanced in German works in opposition to Gall's views on the chief function of the cerebellum, I must add that I have not found any facts adduced sufficient to convict him of error.[1]

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[1] In an essay intended for the perusal of both sexes, I cannot enter more fully into the above subjects, nor refer to my special experiences. A work by Dr. Andrew Combe and George Combe, 'On the

It is now necessary to say a few words on the general agreement in the configuration of the brain, with that of the skull; for unless this agreement be established, Gall's method of ascertaining the psychical functions of the former must lose its validity. This general correspondence is acknowledged by the best authorities in human anatomy. Professor Aeby says: 'The brain fills the interior of the skull almost entirely, and therefore its external form may, on the whole, be regarded as a cast taken from the interior of the latter.' There are numerous impressions on the inner surface of the skull, caused by the action of the brain-convolutions and the blood-vessels, showing their influence on the bones, the usually supposed rigidity of which is, in fact, a relative matter only.

All development is from within outwardly, and in a normal state of bone growth, the skull follows and adapts itself to the growth of the brain. The skull, exclusive of the facial bones, is said by many anatomists to consist of three vertebræ (so called from their real or fancied analogy with the spinal verte-

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Functions of the Cerebellum,' by Gall, Vimont, and Broussais,' Longmans & Co., 1838, contains valuable information.

In a German work: 'Über die Funktion des Kleinen Gehirns,' by Dr. Liedbeck, Carlsruhe, 1846, the views of Gall and those of his chief opponent, Flourens, are reconciled. According to Dr. Liedbeck's researches, and his survey of the experiments and pathological experiences of different physiologists, he finds the grey surface parts of the cerebellum to be chiefly connected with sexual desires, whereas the deeper lying parts are the regulators of locomotive and muscular movements in general.

bræ[1]) comprising seven different bones, not including the Wormian (ossa intercalaria). At birth the bones are comparatively soft, and several are connected only by elastic membranes. Some of the bones gradually close entirely, and become united after birth, others remain connected by sutures, which enable the brain skull more readily to expand. In old age again, when the brain sinks, the skull gradually follows and decreases in size and elevation. Cases of hydrocephalus, abnormal bone developments, and bone diseases excepted, the skull, therefore, on the whole, indicates in all periods of life, the surface-form of the brain. The skull, however, must likewise be regarded from a mechanical point of view. There are certain parts of the skull invariably thicker than others—the points of ossification, for instance, and the processes or prominences to which the large muscles of the face and neck are affixed. Partly through the action of facial muscles, the temporal bone is always much thinner than the other bones. There is likewise an absence of exact parallelism in the two plates of which the skull is composed, that of the frontal sinus being the most conspicuous. In short, a special study of the bones of the skull in the principal stages of life, is necessary before the development-form of the brain can be correctly estimated by inspection of the head. Viewed on the whole and in general, childhood, youth, maturity, and old age, have each their typical forms of the skull, though in every concrete case, individual peculiarities of development are likewise apparent. The relative depth and elevation of the central and frontal fossæ of the skull also demand attention, as these circumstances are connected with mental life.

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[1] This idea was first started by Oken, and was likewise held by Goethe. Carus subsequently based upon it his so-called 'Scientific Cranioscopy,' but he connected the so-called temporal vertebra of the skull with the corpora quadrigemini, which he held to be mainly the seat of emotional life.

The difficulties just referred to in the way of obtaining perfectly accurate knowledge of the development-forms of the brain, by an examination of the head, taken together with what has previously been said of brains themselves, in respect to the varying character of their convolutions and their amount of grey cells and fibres, must naturally appear greatly to qualify the value of Dr. Gall's localisation of faculties from morphological experiences. As a rule, however, all parts of the brain partake of the same general constitution; and as regards power or energy of mental life on the whole, neither Gall nor any of his enlightened followers, have ever held that these can be measured by size or quantity alone. Quality of brain, in so far as it can be estimated by the study of the general physiological constitution, or the so-called temperaments, is always considered along with the law of quantity.

In respect to the brain, as to every other bodily organ, size, *ceteris paribus*, is held to be a measure of power. For the purpose, however, of establishing the principle that mental faculties are localised in the brain, the law of quantity, as will presently be shown, may be viewed alone. In general, it may be presumed that where there is great deficiency of nervous energy—of the so-called nervous principle—and when morbid conditions of the viscera and blood lower the action of the brain, all parts of that organ will be affected, and the skull will, neither on the whole nor in particular directions, have much capacity of expansion. In opposite cases, however, where the general health is good and the nervous energy great, the parts of the brain hemispheres inherently the largest will have the greater tendency to activity, and, by the law of growth through exercise, to further increase in size. Under all circumstances, therefore, the *relative size* of different parts of the head will give the key to the relative strength of different categories of mental life. It is this relative not absolute character of the experiences gained respecting localisation of faculties, to which, again, I must emphatically direct attention.

The converse of what has been advanced likewise holds good. Unfavourable circumstances, want of stimuli, disuse of the organ of the mind, will diminish its size on the whole, or in particular directions.

This may be seen on a large scale in nations deprived of liberty, especially if reduced to slavery. 'Diminuti capitis,' as the Roman law said in reference to Roman slaves.

In the way indicated, some branches or races of the human species, under very favourable geographical, climatical, and other circumstances, sexual selection, &c., have in the course of ages come to have larger and better formed brains and skulls than other branches.

As regards size and weight of the whole brain, experiences have been gained showing that eminent men, those who have manifested force of character, as well as of intellect, have had very large brains. In such instances, however, the brains have been found well proportioned, the different lobes fully developed. If mere size and weight of brain on the whole, without reference to its form, were held to give a large amount of mental activity in *all* directions, how is to be explained, it may be asked, that many low and criminal natures, whose heads are large in general, are yet found to be inherently deficient in moral and intellectual power ? The answer is plain. Although their heads on the whole are large, their great size is owing to an abnormal development of the basilar and occipital regions; whereas the frontal and coronal are relatively, and often absolutely, very small. Thus the deficiencies mentioned are readily explained.

However, the value of size and weight of brain on the whole, i.e. of an average or normal size, for the display of general mental activity, becomes apparent when we look to the brains of idiots. Whenever the adult human head is less than thirteen inches in circumference, idiocy is the invariable concomitant.[1]

In the conviction that on the whole, and in general the form of the skull is the same as that of the brain, and that the latter is the organ of the mind, physiologists and members of anthropological and ethnological societies in different countries, have of late years more than ever busied themselves with measuring skulls, ascertaining their cubic contents by weighing shot or other substances with which they have been filled, in studying the relative development of the different skull bones, &c. Such proceedings would have little meaning, unless they had reference to characteristics of mental life; and this, indeed is shown to some extent to be the case, especially in regard to the different races of men, and the somewhat differing mental qualities of the two sexes.

[1] Of the brains of eminent men weighed after death, that of Cuvier was found to be 4 lbs. 11 oz. 26 grains—of Dupuytren, 4 lbs. 10 oz., whereas the brain of an idiot fifty years old was only 1 lb. 8 oz.; and of another forty years of age, only 1 lb. 11 oz. The mean weight of brains is said to be 3 lbs. to 3 lbs. 11 oz.* Professor Luschka states the weight of the brains of adult microcephalic idiots to be only one-third of that of ordinary adults.†

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* R. R. Noel. 'Grundzüge der Phrenologie,' p. 51.

† 'Archiv für Anthopologie,' vol. v. p. 497.

The classification of heads, however, as dolichocephalic, and brachicephalic (long heads and short heads), now so much the fashion, throws but little light on the characters of races, and still less on the dispositions and capabilities of individuals; and Professor Aeby has well remarked that it would be better to classify heads of human races as steno = and eurycephalic (narrow and wide heads), than in the way just mentioned.[1] This observation of a distinguished anatomist agrees with my experiences respecting European heads, for I have found more striking differences in the natural character connected with narrow and wide heads, than with long and short. I have known some long-headed men to be very stupid, and others very clever, and have gained similar experiences in regard to short heads. Indeed the longest head I have ever measured is that of a Saxon suicide, who was remarkably deficient in understanding—using the word as including reflective power. (See plate iii. fig. 4). The great length of his skull,[2] is owing to an abnormally large occipital region, whereas the frontal region is extremely retreating, narrow, and *shallow*—and what I mean by the latter term will presently be explained. But the great attention now bestowed by anthropological associations on cranioscopy, although as yet more with reference to the anatomical characteristics in the skulls of different races of men, than to the mental life of the latter, may in the end prove of much value. The special observations of the basilar bones of the skull, and their relationship to the facial bones, have shown that there is a well-marked difference, besides prognathism, in the skulls of negroes and those of civilized Europeans; for in the former the position of the large occipital hole (foramen magnum) on the atlas—the uppermost of the spinal vertebræ—displays a nearer approach to the skulls of the lower vertebrates than it does in the skulls of the latter.[1]

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[1] Op. cit. p. 250.

[2] I have measured the skull, which was preserved in the Anatomical Museum of Dresden (now removed to Leipzig), as well as the head soon after death. The length of the latter was 8$\frac{5}{8}$ Eng. inches.

With reference to the bones at the base of the skull, I may mention here that a German professor who has written a popular work on human physiology,[2] considers cretinism to be owing to the too early closing of those three parts which form the basilar bone (*os basilaris*), and the obliteration of its sutures. This bone is compared to the keystone of an arch, whose form necessarily has an influence on that of the whole structure. A too early closing and thickening of skull bones, as likewise particular bone diseases, may undoubtedly to some extent impede the development of the brain;

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[1] 'Archiv für Anthropologie,' vol. iv., p. 287.

[2] 'Das Leib des Menschen,' von Prof. C. Reclam. Stuttgart, 1870, p. 76 and fol.

but as regards the skulls of cretins, many other circumstances besides the early closing of the basilar bones must be taken into consideration in seeking an explanation of this form of idiocy. In cretins generally there is a great and inherited want of constitutional vigour, the result of an accumulation, through many generations, of circumstances most unfavourable for general health, and particularly for that of the brain and nervous system. In the Alps cretins are generally found in low, confined, or morassy situations, often in narrow valleys, deprived to a great extent of sunshine. Isolation, want of mental exercise, coarse and chiefly fat-generating food, and drinking water, often greatly impregnated with lime—which in the constitutionally feeble may have an influence in the hardening of bones, must be included amongst the causes of cretinism. Professor Reclam confounds cause and effect, and has paid no attention to the remarkably deficient and shallow development of the frontal bone in the skulls of cretins, which extensive observations in districts where they abound have shown me to have been an invariable characteristic with these miserable cripples—both bodily and mentally. (See plate iv. fig. 2).

I have dwelt so long on this subject, because not only the abnormal skulls of cretins, but many other forms of the skull and facial bones, are now held to be mainly owing to peculiar developments of the basilar bones.

In their theories of skull-formations, it appears indeed, as if many craniologists omitted the brain, and its formative energy from consideration. They appear, likewise, to pay little regard to other centres of bone-growth—for instance, the points of ossification in the frontal and parietal bones, besides those at the base of the skull.

In those European countries with which I am more or less well acquainted, I have observed long heads and short heads, wide heads and narrow heads, though in each country, on the whole, I have seen the one or the other shape to preponderate. For instance, I have observed that generally the heads of northern Frenchmen, Italians, Celts, and Slavonic peoples, are longer and narrower than those of the modern Germans. The heads of the latter are generally very wide and high, as well as short. In every country, however, where I have examined the heads of the living—to whichsoever classification of craniologists they may have belonged—I have invariably found the relative development of the different regions of the head, to which I have called attention, to be in agreement with well ascertained facts of individual character.

I must now explain the term *shallow* used above, in reference to the frontal bones of the skull, and this will give an opportunity to call particular attention to a well-marked and easily observed difference in skulls, and in the heads of the living, which coincides with an equally well-marked difference in respect to one category of mental life—the intellectual. What I am about to advance will suffice to demonstrate the truth of that principle which Dr. Gall devoted his life to expounding: viz. that different mental functions are located in different parts of the brain.

In a general way, the brain, exclusive of the cerebellum, is said by anatomists to display four lobes—the frontal, the temporal, the parietal, and the occipital. To these a fifth, but very small, lobe is reckoned (lobus centralis), which, as, in fully developed human brains, it lies in the cavity of Sylvius (fossa Sylvii), and is not visible on the surface of the brain, I need not take into special consideration. Of the four first-named lobes, the frontal is the one most distinctly marked, and the most easily distinguishable from its neighbours—the cavity and fissure of Sylvius separating it at its central basis, and laterally, for a considerable extent upwards, from the temporal lobe. This fissure is the first formed in the embryo, and remains through life the largest of the permanent divisions (exclusive of the longitudinal division into hemispheres) on the surface of the brain. The seat of the frontal lobe in the skull is likewise distinctly marked. If a skull be cut open horizontally, the basis of this lobe will be seen to lie on a kind of upper platform, the supra-orbital plate of what is called the frontal vertebra, viz. those parts of the frontal and sphenoid bones which form the roofs of the orbits.

This plate is, in general, considerably higher than the cavity (*fossa*) in which the temporal lobe rests. The inward extent of the supra-orbital plate, though quite apparent in open skulls, can only be known in intact skulls, and in the heads of living persons, by the following method of observation. In skulls a kind of indentation will be seen on either side, at the lower ends of the coronal suture, at the points where this suture touches upon the sphenoid bones, the greatest depression in which generally corresponds with the lateral division of the brain into frontal and basilar lobes. In living heads it is not difficult to feel this indentation, and there is another circumstance which will assist in ascertaining its position. If a vertical line be taken upwards from the most prominent and central point of that part of the cheek bones called the zygomatic arch ; it will be found very nearly to coincide with the inward extension of the supra-orbital plate, and consequently of the frontal lobe of the brain. The width and height of the latter—in the living, of the forehead—are easily perceptible. But many foreheads, viewed only in front, may appear both broad and high, and yet the intellectual region may be extremely shallow. To estimate correctly the intellectual capacity, it is even more necessary to ascertain the depth of the frontal lobe towards the ears, than to measure its breadth and height. In this respect the old saying 'shallow-pated,' applied to stupid men, is not without its point.[1]

The frontal lobe of the brain, moreover, is the last to attain its full size, and this fact agrees with our experience, that the intellect is developed much later than are the feelings. The bones of the skull, too, 'show a greater effort towards freedom,' to quote the words of an anatomist, in the anterior superior parts of the head, than they do in the posterior and basilar.

Whatever difficulty there may be theoretically to give a perfectly clear definition of intellect, in contradistinction to feeling, yet practically, a difference is always admitted—as the usage of language in every civilised country plainly shows. The heart is vulgarly supposed to be the seat of all emotions, whilst the brain is held to be exclusively the organ of thought. But this opinion is not supported by physiology; the brain being now generally acknowledged to be the organ of the whole mind, it is unnecessary for me to do more than again call attention to the fact, that we frequently hear men classified as

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[1] Compare Plate II. figs. 1 & 2, Plate III. figs. 3 & 4, and Plate IV. figs. 2, 3, 4, & 5.

'men of feeling,' and 'men of intellect,' and that instances of strong passions combined with weak intellects, and *vice versâ*, are often met with.

As bearing on this point, I appeal to general experience, that the act of thinking, though usually calm and unaccompanied by any particular excitement of the viscera, often leads to strong emotions and bodily disturbance. For instance, when we are unoccupied, and ideas (pictures and incidences of our lives, &c.) involuntarily flit through the mind—to use a common expression—the thought of some experienced or expected pain or joy—as of an insult received, or of an approaching meeting with one we dearly love—will arise. Suddenly—especially in those naturally disposed to pride or affection—the heart will beat violently, the face become flushed, and some time will elapse before the flow of ideas resumes its normally calm course. Although in thinking and feeling, the mechanical, chemical changes in the complexes of nerve-cells and fibres in the brain are unknown, yet those who carefully interrogate nature cannot doubt that such mental states are physical, and that their order of succession and association is according to fixed laws. The differences, the different effects on bodily organs, moreover, apparent in the processes of thinking and feeling, point theoretically to functional activities of different portions of the brain hemispheres. And we have the broad fact in support of this view, that men, the frontal lobes of whose brains are small, consciously think and reflect much less, and act more impulsively, than do men whose foreheads are relatively large.

For the purpose, therefore, of testing the principle of size with reference to functions of the brain, we must extend our observations over a large social area, and carefully note a very great number of cases. If we will do this, and view our experiences as a great whole, we may abstract the principle of quality of brain, and the development of the frontal lobe, in its relation to the other lobes of the brain—estimated in the way I have indicated—will be found to be in agreement with the relative amount of intellectual capacity. Without pausing here to consider particular forms of that capacity, as special aptitudes and talents, let men be classified in a general way as clever and dull. If we then compare the foreheads of statesmen, lawyers, physicians, men of science, merchants, manufacturers, &c., who have attained eminence in their several pursuits, with the foreheads of men of generally acknowledged mediocrity of intellect, the fact of differences in the frontal part of their heads, to which I have directed attention, will become apparent. Further, if the foreheads of the two classes of men be measured, the measurements being taken over the brow from the lines of indentation in the sphenoid bones on either side—and the mean of a great number of such measurements be compared, the principle that in respect to the intellect, size is a measure of power, will be mathematically established.

Moreover, in viewing, in the bulk, measurements of the two classes of men, taken in the way indicated, not only may the law of quality be left out of consideration, but the measurements require only to be very numerous, and of both classes equally so to render the disturbing consequences of inequalities in the thickness of the bones of the forehead, and of their divergence from parallelism (the frontal sinus), as also of any little inaccuracies in the manner of taking measurements themselves, of small account. According to the law of equivalents, the sum of disturbing causes on the one side, will be compensated by a like sum on the other.

A similar method of testing the principle of relative size may be applied to other parts of the head. It is my full conviction, the result of extensive observation, that two other categories of mental life—the so-called animal and moral—are likewise connected with two other regions of the head ; the first with the temporal and basilar region, the second with the coronal.

By the term animal category, I allude to those faculties for the most part common to man and animals, and which are the chief sources in man of what in especial is called his 'selfish nature.' The moral category includes man's higher social dispositions, the sources of his benevolence and sympathy, his feelings of reverence and piety, and his sense of duty.

If we compare the most ancient skulls found in Europe, those of the 'Troglodyte race of men,' or 'primitive Spelæan people,'—to use the term applied by Richard Owen to the ancient people whose skulls have been discovered of late years in caverns along with the bones of extinct mammals, flint implements, &c.—with the average European skull; further, if we compare the heads of modern savages of the lowest type, and of the brutal and ruffianly natures, still to be met with in highly civilised communities, with the heads of men distinguished for intellectual and moral qualities, wherein are the differences found to consist? They are in the relatively greater development in the heads of the average European, and still more palpably in those of eminently moral and intellectual men, of the frontal and coronal regions; in that extension and elevation of the mantle of the brain, to which I have previously called attention. In the skulls of the 'primitive Spelæan people,' of modern savages, and of the lowest and most brutal class of European populations—displaying the so-called criminal type of head—the parts just mentioned are low and imperfectly developed, whereas the basilo-central and posterior parts are relatively, and often absolutely, extremely large. (Plate iii. fig. 4, and Plate iv. fig. 5), And here, in alluding to ancient skulls, found in European caverns, I must mention a singular statement of Professor Huxley's. In his work 'Man's Place in Nature,' he says of the Engisthal skull, 'it might have belonged to a philosopher, or might have covered the brains of a thoughtless savage.' This dictum of an eminent physiologist and craniometrist has, I confess, much surprised me. If we could assume that such a thing as philosophy could have been possible in the age and land to which the possessor of the Engisthal skull probably belonged, nevertheless I can confidently assert that no man possessing large reflective power and philosophical acumen, can anywhere be found with a head shaped like the skull in question—judging it according to the description and drawings in Professor Huxley's book. But apart from this particular skull, where, I may ask, is the skull of a savage to be seen of a shape and proportions such as would allow the inference that it might have contained the brain of a philosopher? Apparently Professor Huxley has not observed the importance, for intellectual life, of a relatively large development of the frontal lobe of the brain, and of its seat in the skull.[1]

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[1] In the autumn of 1871, I saw in the private museum of Mr. Lukis, at St. Peter's Port, Guernsey, several skulls and portions of skulls, particularly frontal vertebræ—of an ancient Celtic people, which had been found in or near the cromlechs of that and the other Channel Islands. These skulls are probably about 4,000 years old. They are remarkable

In further specialisation of mental faculties, connected with particular forms of the head: very benevolent and very unfeeling, so-called kind and hard-hearted men should be contrasted. In the heads of the first, the frontal curve of the crown will be found to be relatively prominent; in the second the reverse. The latter class of men, moreover,—particularly those who are generally designated as very selfish—are eurycephalic, i.e. the basilo-lateral parts of the temporal lobe in them are wide and protruding. The first—particularly generous natures—on the other hand, are generally stenocephalic, i.e. the parts just mentioned do not protrude, the heads are narrow. Further, very proud and haughty, and very humble and modest natures, may be contrasted. Of these two classes, the heads of the first

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for the thickness and coarse texture of the bones, for the great size of the occipital and temporal vertebræ, and for the very small development of the frontal. The foreheads in all of them are singularly flat, narrow, and retreating. But for the absence of counter-pressure on the occipital bone, they would resemble the skulls of the Avaren, found in Hungary, of a section of the ancient inhabitants of Peru, and of the 'Flat heads' of America, all of whose foreheads appear to have been cramped and flattened artificially.

The skulls in Mr. Lukis's interesting archæological museum are instructive, as adding to our experiences that the direction of the brain-development accompanying progress in civilisation is shown to be in the increasing extension and elevation of the frontal and coronal parts of the so-called mantle.

An account of the firmly-seated teeth in these ancient skulls, in several specimens of lower human jaws, and of a great number of human teeth found separately—all of which are remarkable for their great size and strong enamel—has been communicated by me to the 'British Journal of Dental Science,' May, No. 191, 1872.

will show the posterior curve of the coronal region to be prominent, whereas the contrary will be the case in the second. Very cautious and wary, and very incautious and rash characters may also be contrasted with reference to coincidences in the forms of their heads, and morphological evidences pointing to localisation of faculties will again be obtained. In the instances referred to, and others that could be mentioned, the evidences are negative as well as positive, and therefore carry with them the greater weight.

To consider, again, the frontal lobe of the brain as specially the seat of intellectual faculties. Differences are observable in the foreheads of great painters and great musicians, of great poets and great mathematicians, of very observing, matter-of-fact men and of those fond of theoretical speculation, and abstract reasoning. I have never seen a great historical or portrait painter, the lower central part of whose brow was not prominent, the eyes rather wide apart; nor have I seen a great musician whose forehead was not prominent above the outer angle of the eyebrow. Differences in the development of the upper and of the lower parts of the forehead will generally be found to coincide with well-marked differences in the direction of the intellectual capacity above alluded to. Although the frontal sinus, the greatest divergence from parallelism in the plates of the skull, renders the development of the brain lying immediately behind the lower central portion of the brow, difficult to estimate, and, therefore, throws doubt on the localisation of several phrenological faculties; yet the inward extension of the frontal lobe, its width and height, are easily observable. Development in either direction, viewed on the whole, will be found to be connected with a particular direction of the intellectual capacity. Whenever the frontal lobe is both deep and wide, it is generally a sign of considerable observing power; whereas great reflection, that which Humboldt so well designates 'combining understanding,' I have never seen unless the upper portion of the forehead be likewise prominent.

I have ground, too, for inferring that consciousness, in so far as this word implies reflection on outward impressions and inward sensations, is mainly connected with the central and superior parts of the forehead. Consciousness, however, in its full sense, as I have previously observed, must greatly depend on the nature or quality of our sensations, which again depend on special faculties; for a person, I repeat, without capacity to perceive all the primitive and complementary colours, or all musical cadencies, can have no full consciousness of harmony, either in colouring or music.

As for self-consciousness—which plays so conspicuous a part in psychological theories—as far as the sense of individuality is concerned, it has its gradual, historical growth. The child begins by speaking of itself in the third person, and learns to know itself objectively, before a subjective consciousness is acquired. This latter, when developed, must naturally reflect the colouring of the prominent, inborn dispositions, as well as of the special experiences of our lives. Mere knowledge of self, however, like every other form of acquired knowledge, can be lost by brain disease, as is frequently observed in the insane. In dreaming, too, we sometimes imagine ourselves to be someone else than we really are. Drunken men, moreover, appear temporarily deprived of self-consciousness, though their knowledge of outward objects is but little obscured, and their feelings and flow of ideas may be over-active.

Facts and arguments, similar to those showing that consciousness is not a simple, not a fundamental faculty—in the sense in which Gall used the term—could be brought forward to show that other powers of the psychologists, as imagination, sympathy, attention, judgment, the will, &c., are only such in a general and abstract sense, and that when viewed in the concrete, such powers disclose the activity and combination of different innate faculties, inherited dispositions, and the influences of education.

To prove the correctness of what has just been advanced, a separate essay would be required. I offer here, however, a few observations on 'the will,' as this term is used by writers on the mind in a very vague and general way.

For the sake of distinctness, we must consider the will under the aspects of—1, impulses, volitions; 2, energy of character in general; and 3, the higher or so-called moral will.

Our volitions are as various and numerous as are our desires, and these are the outcome of our inborn dispositions or special faculties—animal, moral, and intellectual. Each faculty, *sui generis*, contributes its quota to the manifestation of volition. The sensualist will seek the gratification of his particular desires; the acquisitive, grasping man will display volition in striving for wealth, and in hoarding money; and different, again, are the volitions of the ambitious, the benevolent, the religious, as well as of those possessed of intellectual gifts, such as talents for languages, for music, painting, mechanics, &c.

But apart from particular dispositions, desires, capacities, tastes, talents, &c., men are usually, and not incorrectly, classified as strong and weak, with reference to their characters in general; and the differences thus referred to are, to some extent, connected with the physiological constitution on the whole. Men of feeble constitutions, and of very nervous temperament, are generally seen to possess less will than the energetic and robust. Many pathological circumstances, even temporary illnesses, as a severe cold in the head, may deprive us, as is well known, of strong volition for a time.

But in viewing the will in general, and on the whole, we may leave aside the bodily circumstances just referred to, and not only will special sources of volition and the influence of the understanding be apparent, but something in addition will be seen, usually called firmness, determination, consistency, &c. in carrying out our resolves. By close attention to the mental life of men usually distinguished as strong and weak characters, Gall believed that he had discovered a particular faculty, which he called 'firmness,' and that this faculty, together with 'self-esteem,' contributed to give force to volitions and to the decisions of the understanding. Whenever he remarked the faculty of firmness in a person of a generally low, animal type, he found determination displayed in purely coarse, selfish ways, in strong self-will and obstinacy. When, on the other hand, he observed character shown in a moral way, truthfulness, sense of duty, and regard for the claims of others—he found that the whole frontal and coronal regions of the head—including the seat of firmness—were relatively very prominent.

That will is not purely an intellectual power, as some thinkers suppose, may further be inferred from expressions in general use concerning 'conflicts in the mind,' 'contending impulses,' and the 'dictates of the understanding, and of reason,' being too frequently disregarded. In too many instances the strongest impulse or motive, independently of the judgment, decides the action.

Many very intellectually gifted men, moreover, especially poetical natures, are noted for weakness of character.

Facts such as I have alluded to would be inexplicable if the human mind were homogeneous, and the principle of localisation of faculties unfounded. Gall's experiences concerning that particular element of will, called firmness, have been confirmed by his followers; and the theory—based on empirical observations—of volition in its various forms, and of will in the sense of character, whether of a low, or a moral kind, affords more insight, and of a concrete nature, into these phenomena of the mind, than can be derived from the abstract teachings of those philosophers who view 'the will' as a special, unified faculty.

As another instance of speculative generalisation on an insufficient basis of observation, I will add a few words here on a psychological theory which has been generally accepted by German physiologists. It is the theory whereby all mental actions (Seelenthätigkeiten) are resolved into conceptions (Vorstellungen). The senses being regarded as apparatuses for receiving and conducting impressions—their so-called 'adequate stimuli,' and the brain held to be the seat of actual sensations, and of the conceptions and impulses which follow on them, the process of mental actions is said to be threefold, viz. 1, sensation, 2, conception, 3, impulse (Empfindung; Vorstellung; Streben); and, inasmuch, it is said, as the conception to which a sensation necessarily gives birth determines the action, all mental life is resolvable into conceptions. The process of mental evolution in this theory is correctly described. Nevertheless, as psychical reflex-actions on outward impressions are ever varying, are never exactly alike in any two human beings, it is necessary to account for their individual character. This is found by the theorists alluded to, to depend on the amount of conceptions which each person has treasured up in his brain. But this view will not explain the overwhelming force of particular feelings and passions, which we not unfrequently experience, and manifest to others, quite in opposition to the promptings of the understanding, that is to say, of the conceptions, or knowledge, derived from experience. Feelings and passions, moreover, may be long enduring and obstinate; and frequently no conceptions of their folly or even of their immorality, are found adequate to restrain their activity. The inborn disposition, as I have already sufficiently explained, is more distinctly pronounced in psychical reflex-actions—which are generally the immediate outcome of very strong impressions—than are the conceptions of the wisdom or unwisdom of our actions.

I have noticed this German theory chiefly because it shows the fascination thinkers find in trying to reduce mental phenomena to a system, and in establishing a formula for their general explanation.

In mental operations, however, it is not possible, I allow, entirely to dissociate subjective and objective impressions, and their correlative conceptions. The theory of Locke, rejecting innate ideas, requires considerable modification. Conceptions, or at least the germs of conceptions, are innate in animals and man, and influence their actions. They come into the world with the analogues of individually acquired memories and habits. Instinctively the new-born babe and young mammalia generally apply their lips to the teats of their mothers ; instinctively puppies will display destructive tendencies at the first sight of certain creatures ; they will hunt and worry mice, &c., without having been taught by their parents, or man, so to do. It is the same with kittens, who instinctively crouch and spring at their prey. The young of certain breeds of dogs, show reactions of the brain on outward impressions, in the form of pointing at game, retrieving, &c. These dispositions are 'born in them,' as I have heard game-keepers say. Similarly in man, various innate emotions and impulses, tastes, likings, and dislikings, &c., follow spontaneously on impressions on the senses caused by particular outward objects. Very abnormal psychical phenomena of this kind are called idiosyncrasies, and generally die out with the individuals who have displayed them. I allude, by way of example, to the repugnance of James I. of England to the sight of naked steel. Many mental peculiarities however, in whatever circumstances their genesis may be sought, become permanent in families and races. The observation of this fact induced Lady Mary Wortley Montagu to declare that 'God had created men, women and Harveys.' Gipsies, too, who have continued generation after generation to lead a vagabond life in the midst of civilised communities, appear to have inherited this propensity from a migratory tribe of Hindostan, from which ethnologists and philologists now fully believe them to be descended.[1]

The anatomy of the brain, in so far as its complicated structure has been unravelled, shows an intricate interlacement of all its parts, whereby the associations of conceptions and feelings, as displayed in particular tastes, habits, &c., inherited and acquired, may find an explanation.

In regard to what has been said on the development forms of the head, as indications of the more general and prominent mental dispositions, it may perhaps be objected that the morphological and psychological experiences referred to, have no claim to be considered as more than mere coincidences! But if such coincidences be general, and if, viewed in the bulk, they establish a rule, no denial of their truth, and the inferences deducible from them, can have any value unless supported by counter experiences, which I, for one, deny the possibility of producing. Moreover, as already stated, the negative evidences of the localisation of faculties are as numerous as the positive, and as they are the more easy of observation, they are the more instructive.

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[1] 'Archiv für Anthropologie,' vol. v. p. 269 and fol.

We must bear in mind, further, the agreement of the doctrine of speciality in regard to functions of the brain, with the principles of physiology in general, which teach that in the animal world there is increase of parts and functions, differentiation and specialisation of organs—more division of labour, so to speak, the higher the creatures stand in the scale of animal life. In the lowest forms, different functions, as excretion, motion, breathing, digestion, propagation, &c., are performed by the same organ. Mr. Darwin says: 'A naturalist justly considers differentiation and specialisation as the test of perfection.'

In offering a few observations on physiognomy, and its agreement with Dr. Gall's doctrines, I must state that I do not allude to the facial bones, or the features only—which, however, as indicating peculiarities of race, have some connection with the historical growth and form of the human brain—but that I confine myself to pathognomy, or the natural language of particular faculties. The expression of the emotions, the passions, the intellectual operations, displayed as reflex-actions—or as conscious mimickry and pantomime—in the eyes, the voice, the movements of the face, limbs, &c., is of highest interest. Every positive emotion has its characteristic signs, which, to some extent, confirm the position in the head of several of the special faculties, and show their influence on the facial expression and automatic movements of the body. For instance, it has been generally remarked that habitually proud and haughty men carry themselves erect and stiffly; and that in supreme moments of their egotism, they throw their heads backwards. 'Er trägt die Nase hoch,' (He carries his nose high) as a German proverb says of a proud man. This coincides with the position of a large faculty of 'self-esteem,' located in the backward bend of the crown of the head. Very benevolent, and very thoughtful men, on the other hand, incline their heads forwards. Very cautious men sway their heads gently from side to side, to which fact, probably, the term circumspect (from circumspicere) came to be applied to them.

Very cunning, false men, carry their heads obliquely. Their eyes, too, have an unsteady fox-like expression; they can seldom look anyone full in the face. These natural signs of character agree with the position of the faculties respectively alluded to. Of course very intellectually astute men have great power of repressing or disguising the natural expression of falsehood, as well as of their thoughts and feelings in general. It is in children and impulsive adults that pathognomy is most easily studied. It is remarkable, however, that children and dogs are often better judges of the natural dispositions, than highly educated adults. The more value we attach to articulate and conventional language, the less attention we pay to so-called natural language. I have frequently seen those who have no natural liking for children, try to flatter their parents by caressing them. The latter may be deceived ; the little ones not. In such cases, a two-fold expression may be observed ; the one form true, beyond the power of control, the other, strained and false. These few remarks on a much-embracing subject, must here suffice.

If all be true, that I have advanced, how comes it, it may be asked, that the main principles of so-called phrenology meet with so little acknowledgment ; that anatomists and medical men generally, that psychologists, even of an 'objective reality' school, do not allow them to have any scientific value? Further, how comes it that believers in these principles are generally looked upon as dreamers, fools, or charlatans? The causes of the opposition to phrenology are manifold. I will point to a few that appear to me most prominent.

Firstly. The mapping of the head into so many separate organs of various forms and sizes, now round, now oblong, &c., with positive boundary lines, has done much to discredit phrenology. But Dr. Gall, as already stated, is not answerable for this. He merely marked little circles on skulls indicating the parts he had observed to be prominent in unusual instances of predominant dispositions, talents, &c.

The vulgar notion, too, that the followers of Dr. Gall examine heads to find out little protuberances —'bumps,' as they are called in derision by small wits—has assisted in throwing ridicule on the subject of their inquiry. But Dr. Gall's method of observing heads actually excluded attention to minor points of skull development. His words are: 'Jamais je n'ai prétendu distinguer des modifications peu prononcées des formes du crâne, ou des légères nuances du caractère.'[1]

I have confined myself to calling attention to prominent forms of the head; to the different directions in which the brain hemispheres may be seen to be developed; to regions of the head, and some subdivisions or seats of particular faculties. And even in regard to these, I confess myself unable to mark out absolutely boundary lines. The knowledge which has been acquired of the seats of faculties can be said at present to be only estimative, approximative; similar to that of the medical practitioner, when he estimates the size of internal organs of the body which he can neither weigh nor measure. Anatomists in particular repudiate phrenology, because of the inability to distinguish separate organs in the hemispheres of the brain. But such an objection to the principle of localisation of mental faculties applies likewise, I repeat, to the nervous system in general. Although it is well known by experiments, reflex-actions, &c., that complexes of nerve-fibres running in the same sheaths subserve different purposes, yet, absolutely speaking, boundary lines of the different sets of nerves are not at present distinguishable. In respect, however, to the possibility of distinguishing anatomically separate organs in the brain hemispheres, a late discovery of a distinguished English physiologist is of the greatest importance. Dr. W. B. Richardson has discovered in a dried human brain that numerous small portions of the convolutions are separated from one another by a delicate membrane (the pia mater), so that he can take them out and put them together again—as he expressed himself to me—'like a Chinese puzzle'! I have been favoured with the view of a slice from a dried brain-hemisphere, and the fact is as described. Dr. Richardson, further, has given his views of the brain in the following words: 'It appears to me as though the brain were not made up of portions of the same matter all united into one organism, but as though it were distinctly mapped out into insular divisions, each well separated from its neighbour, and having its own duties.'[1]

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[1] Gall, 'Sur les Fonctions du Cerveau,' tom. iii. p. 41.

Secondly. Physiologists generally have uncritically accepted the metaphysical doctrines of mental philosophers. They have thus, so to speak, put themselves out of court as witnesses respecting the localisation of mental faculties in the brain of a character, as I have explained, so totally different to those of the philosophers. Moreover, as regards insight into the anatomy and functions of the brain, I will quote the words of a distinguished anatomist. Professor Aeby says: 'For the full understanding of the functions of the nerves of the peripheral system, the closely interlaced nets of the nerve-trunks often offer insurmountable difficulties, not to speak of the central organs, whose complicated courses of cells and fibres in their interrelationships, defy all efforts to unravel. To gain knowledge of the interior construction, and consequently insight into the true nature (*Wesen*) of the nerve-apparatuses, we are reduced almost exclusively to hypothesis guided by physiological experiment.'[1] Anatomically, therefore, nothing is known about the brain at all opposed to the principles of phrenology. To experiment on the convolutions of the brain, in the hope thereby to gain insight into the operations of the mind, is next to impossible. Vivisections have thrown scarcely any light on the subject. It is plain that when a poor dog has his skull cut open and slices of his brain hemispheres cut away, suffering from pain, fear, and loss of blood, he is unable to reveal to his persecutors whether their knives have deprived him of his instinct for hunting, or of that for loving his master! Birds, rabbits, and other creatures when deprived altogether of their brain hemispheres, may continue to live some time if artificially fed. But their existence is simply vegetative; all instincts are gone; they fall into a state of stupor or somnolency. Pathological conditions of the brain hemispheres, whenever medical men shall know what to look for, will, in the end, it may be anticipated, throw light on the localisation of faculties. I have been present at dissections of brains where portions of the hemispheres have been found to be diseased, and in such instances, I have ascertained by inquiry of the relatives of the deceased, that changes in their mental life, previous to their last illnesses, had taken place, in agreement with the lesions in the seats of particular faculties. Medical men are chiefly attentive to loss of language in connection with brain disease, which now is attributed to hemiphlegia (partial laming) of the one hemisphere, now of the other. Probably, in cases where the faculty of language is lost—a loss, in mental life, by the way, the most readily noted—other faculties may have been lost likewise, though facts of this kind would not necessarily be known to medical attendants on a sick bed.

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[1] 'Memoir of Dr. Conolly,' by Sir James Clark, p. 71. In the sixth chapter of this valuable work, from which the above passage has been extracted, are many sound arguments in support of the principles of phrenology.

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[1] Op. cit. p. 813.

Whether the seats of mental faculties are double or not, is by many considered a moot question. The analogy of the duplex nature of the organs of sense, and many pathological experiences, led Dr. Gall to believe that the mental faculties are double: the same—though in different degrees of size and energy[1]—in either hemisphere of the brain. If it be so, as there are many grounds for inferring, lesions in one hemisphere only would not necessarily

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[1] In general, I have observed the left hemisphere to be the larger one.

(excepting sympathetically) be found injurious to mental life—no more so than injury to one eye prevents vision with the other.

Thirdly. The phrenological naming of the mental faculties is in many instances objectionable. Such terms as 'marvellousness,' 'concentrativeness,' 'ideality,' 'wit,' are neither psychologically simple and clear, nor suited to designate fundamental faculties. The classification too of 'the feelings,' as, 'genus 1, propensities,' and 'genus 11, sentiments,' is far from sound. 'Destructiveness' is classified as a 'propensity;' and when large its functional activity is said to be shown in the force and violence exercised in overcoming impediments, in hatred of opponents, in slaying, murdering, &c. Its normal or medium function, however, is said to be more passive—to cause inward feelings of anger and dislike, which may not inaptly be called sentiments; 'benevolence,' on the other hand, is classed amongst the 'sentiments,' though when relatively very strongly pronounced this faculty is said to impel, i.e. give rise to a propensity to perform acts of beneficence and charity! Dr. Gall designated all the special faculties, the seats of which in the brain he believed he had discovered, 'instincts,' or 'inner senses,' e.g. 'an instinct of cunning;' 'a sense of colour;' 'a sense of musical sounds,' &c. Phrenologists generally, moreover, commit the error of seeming to personify

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faculties, by saying, 'Destructiveness does this,' 'Love of approbation does that,' &c., thus conveying the impression of want of correlation or combined activity in the faculties of the mind.

Fourthly. Professional phrenologists deal largely in generalities, and pronounce too many and too positive opinions on the heads of ordinary, or weak characters, concerning whom very little can be said; for it is just such characters that are most easily swayed by circumstances, and whose heads must not be looked to in confirmation of the principle of localisation of faculties, except in a negative way.

There are undoubtedly numerous cases where it is difficult, and only possible with certain limitations, to apply the phrenological principles. It is therefore *one thing* to prove the localisation of faculties by adducing striking cases, positive and negative, from the great fields of natural history and social life; and quite *another thing* to apply the knowledge thus obtained to all concrete cases. The late Professor Dr. Elliotson has stated it to be the result of his experiences that:—1st. In cases where he had seen great talents and other very prominent mental qualities manifested, he invariably found a corresponding development of the head. 2nd. Whenever he observed particular deficiencies in the form of the latter, he always became assured of corresponding deficiencies in the mental faculties of the individuals.

Such negative evidence of the localisation of faculties I have likewise in general found the most satisfactory.

To include the 'odium theologicum' amongst the causes of the opposition to phrenology—although it has operated powerfully in this direction—is now scarcely necessary. The teachings of Darwin, Maudsley, Huxley, and others in this country have rendered the theological objection to the phrenological view of the mind of little account.

I have mentioned that Dr. Gall considered he had established the seats of twenty-seven special faculties in the brain. To these Spurzheim and his disciples have added eight more, the chart of which on their model heads fills up the whole of its surface.[1] American phrenologists, I understand, have subdivided many of Dr. Spurzheim's organs, and added a great many more. But whether their proceedings have been based on very numerous and accurate observations and correct psychological insight, I much doubt. It is not that I object to an extension of the principle of localisation of faculties. In view of the great variety of inborn aptitudes, and other mental characteristics, specialisation in mental life appears to have an extensive range, and probably the localisation of faculties—or centres of brain fibres and cells—may extend much further than anyone as yet has even imagined. But minute portions of the brain convolutions cannot singly have influence on the form of the head ; therefore, whatever psychological facts may have been brought forward by Americans, I can have little faith in their evidences of new faculties, if based on minute morphological observations of the head. Regions of the head, or groups of correlated faculties—I mean correlated in reference to their genesis, historical development and analogy of character—is about all that forty years of observation, for the purpose of testing the principles of phrenology, has confirmed to my mind. It is my firm conviction, however, that no one who will carefully, extensively, and without prejudice observe nature for himself can fail to become convinced of the physical basis of mental life, and further, that different classes of faculties are located in different parts of the head.

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[1] It was not so in the skulls marked by Dr. Gall. He left many parts unoccupied by organs.

Phrenology at present cannot claim to offer a complete scheme of the functions of the brain, nor a perfect system, of mental phenomena. In connecting man, however, with the rest of the animal kingdom ; in distinguishing primary, and comparatively simple faculties—the so-called animal faculties or instincts—from the secondary and more complex of an intellectual and moral nature, it marks out the true method of investigating mental life, and affords valuable standpoints for further progress. The objective method of investigation, moreover, by checking indulgence in subjective speculation, and in the pleasures of systematising, to which thinkers are so prone—is the only one on which a sound and consistent theory of psychology can ever be arrived at. 'It is not good,' says a German proverb, 'to turn the child into the gutter along with the water of its bath.' Neither is it good to continue to ignore, as men of science and thinkers do, the broad basis of truth in phrenology, because of the stigma which imperfectly educated and superficial manipulators of heads may have cast on the subject.

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